DESTRUCTION OF UNDERSIZED HADDOCK ON GEORGES BANK, 1952

AUG 1954
LIBRARY
POFI
FISH & WILDLIFE
SERVICE

SPECIAL SCIENTIFIC REPORT–FISHERIES No. 129

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Explanatory Note

The series embodies results of investigations, usually of restricted scope, intended to aid or direct management or utilization practices and as guides for administrative or legislative action. It is issued in limited quantities for the official use of Federal, State or cooperating agencies and in processed form for economy and to avoid delay in publication.

United States Department of the Interior, Douglas McKay, Secretary
Fish and Wildlife Service, John L. Farley, Director

DESTRUCTION OF UNDERSIZED HADDOCK ON GEORGES BANK, 1952

by

Ernest D. Premetz
Fishery Biologist
Fish and Wildlife Service

with

Robert L. Cory, James W. McKee, and Craig Slater
Fishery Aids, Woods Hole Oceanographic Institution

Special Scientific Report: Fisheries No. 129

Washington : June, 1954

CONTENTS

Page

Part I: Port Sampling

Estimated destruction, 1952 3

Quantity of discards 3

Season of discards 7

Area of discards 7

Part II: Sea Sampling

Analysis of discards, 1952 7

Weight of discards 11

Numbers discarded 11

Estimated total destruction 11

Average weight 12

Size composition 12

Cull by fishermen 17

Age composition 17

Size composition of ages 28

Summary 34

ILLUSTRATIONS

FIGURE		Page
1.	One of the Boston trawlers on which observations were made at sea	2
2.	Port agent of the Fish and Wildlife Service interviewing the mate of one of the Boston trawlers	6
3.	Destruction of haddock on Georges Bank by the Boston and New Bedford fishing fleets, 1952.	8
4.	Localitities where haddock were discarded by the Boston and New Bedford fishing fleets during 1952	9
5.	Size composition on the average Georges Bank trip observed during 1952	16
6.	Size composition on the average Georges Bank trip observed during Season B, 1952	18
7.	Size composition on the average Georges Bank trip observed during Season C, 1952	19
8.	Size composition on the average Georges Bank trip observed during Season D, 1952	20
9.	Haddock cull curve on the average Georges Bank trip observed during 1952	21
10.	Cull by fishermen on the individual Georges Bank trips observed during 1952.	22
11.	Cull by fishermen on the average Georges Bank trip observed during Seasons B, C and D, 1952. .	23
12.	Size composition of each age in the catch on the average Georges Bank trip observed during 1952	30
13.	Size composition of each age in the catch on the average Georges Bank trip observed during Season B, 1952	31

FIGURE Page

14. Size composition of each age in the catch on the average Georges Bank trip observed during Season C, 1952 32

15. Size composition of each age in the catch on the average Georges Bank trip observed during Season D, 1952 33

TABLES

NUMBER

1. Dates and areas fished on the commercial sea sampling trips observed during the 1952 haddock year 4

2. Destruction of haddock (in thousands) on Georges Bank by the Boston and New Bedford fishing fleets, 1952 . . . 5

3. Discards on each of the commercial sea sampling trips to Georges Bank observed during the 1952 haddock year. . 10

4. Average weight (in pounds) of haddock on the commercial sea samples trip to Georges Bank observed during the 1952 haddock year 13

5. Size composition and cull on the average Georges Bank trip observed during the 1952 haddock year 14

6. The 50 percent cull points on curves of individual Georges Bank trips observed during the 1952 haddock year 24

7. Age composition of haddock on the average Georges Bank trip observed during Seasons B, C and D of the 1952 haddock year 25

8. Percent of each age discarded on the average Georges Bank trip observed during Seasons B, C and D of the 1952 haddock year 27

9. Size composition of the ages in the catch on the average Georges Bank trip observed during the 1952 haddock year. 29

DESTRUCTION OF UNDERSIZED HADDOCK ON GEORGES BANK, 1952

The destruction of undersized haddock on Georges Bank has been of major concern for many years. With the organization of the International Commission for the Northwest Atlantic Fisheries in 1951, the Fish and Wildlife Service recommendation for use of a larger-mesh net to curb the destruction of fish of unmarketable size was given sufficient impetus to ensure adoption.

The haddock year starts in February; therefore, the seasons used in subsequent portions of this paper are as follows: Season A - February to April, Season B - May to July, Season C - August to October, and Season D - November to January. Subsequent references to the 1952 haddock year will be stated "1952".

To assess the effectiveness of the larger-mesh in actual practice, it was necessary to have accurate information on numbers and sizes of fish discarded at sea before and after regulations were applied. A sea sampling program was therefore initiated in 1951. This report continues our study of the fishery prior to regulations.

During 1952, seventeen trips were made by observers to Georges Bank. These trips were made on the following trawlers: Drift, Wave, and Surge-owned by the Birdseye Division of the General Foods Corporation; Flying Cloud and Winchester - owned by the O'Donnell-Usen Company; and the Michigan and Wisconsin - managed by Fulham Bros., Inc. One of the Boston trawlers on which observations were made at sea is shown in figure 1.

NOTE.--This report on the analysis of haddock discarded at sea on Georges Bank during the 1952 haddock year continues a series of annual reports initiated with the following:

Premetz, E.D., 1953. Destruction of undersized haddock on Georges Bank, 1947-1951. U.S. Department of the Interior, Fish and Wildlife Service, Special Scientific Report -- Fisheries No. 96. 33 pp. 12 figs.

All references pertinent to this study are given in the above report, to which the reader is referred.

Fig. 1--One of the Boston trawlers on which observations were made at sea.

The dates and areas fished on these trips are listed in table 1. Most of the fishing was conducted on the Northern Edge (867 sets). The remainder of the fishing was in the South Channel area (169 sets), and on the Southeast Part (118 sets) and Southwest Part (113 sets) of Georges. A total of 1,267 sets was made on these seventeen trips; an average of about 74 sets per trip.

The success of this study has been the result of the cooperation of many people. The authors wish to express their thanks to all members of the fishing industry who cooperated in this study. We are especially grateful to the crews of the trawlers on which the Fish and Wildlife Service observers shipped, and to the owners of these vessels for their splendid cooperation.

The observers were Robert L. Cory, James W. McKee and Craig Slater. The port interviews were conducted by David F. Hammack and Thomas F. O'Leary at Boston, and George W. Snow at New Bedford. Harriett Murray assisted in the tabulation of the data.

PART I. PORT SAMPLING

ESTIMATED DESTRUCTION, 1952

Since 1947, the Fish and Wildlife Service port interviewer at Boston has obtained from Captains of vessels landing at that port, estimates of pounds of haddock discarded on each trip and information as to the area in which the destruction occurred. Data collected during 1952 is presented in this report.

Since landings of haddock at New Bedford had increased, a system for obtaining destruction estimates from fishing masters was inaugurated at that port in July 1951. This system is similar to that employed at the Boston Fish Pier.

Quantity of Discard

Skippers' estimates of the destruction of haddock on Georges Bank, as collected by port interviewers at Boston and New Bedford during 1952, are summarized in table 2. Figure 2 shows the Boston port agent of the Fish and Wildlife Service interviewing the mate of one of the Boston trawlers.

The total haddock discard estimated by the skippers of the Boston and New Bedford trawlers during 1952 was approximately 4.9 million pounds (4.4 million individual fish). Of this total, about 4.2 million pounds (3.8 million individuals), representing 86 percent, was reported by the Boston fleet. This quantity reported in 1952 in Boston approximated

TABLE 1.--Dates and areas fished on the commercial sea sampling trips observed during the 1952 haddock year.

Trip Number	Season	Date	Number of sets	Areas fished on Georges Bank
52-8	B (May to July)	May 19-26	48	Southwest Part
			21	East Side South Channel
52-9		May 28-June 5	36	Northern Edge
			26	Southeast Part
			17	East Side South Channel
52-10		June 19-25	54	Southwest Part
52-11		July 9-17	54	Northern Edge
			11	Southwest Part
52-12		July 12-21	86	Northern Edge
			3	East Side South Channel
52-13	C (August to October)	August 2-10	102	Northern Edge
52-14		August 4-12	70	Northern Edge
			4	Southeast Part
52-15		August 6-13	70	Northern Edge
52-16		August 20-28	74	Northern Edge
52-17		August 22-29	78	East Side South Channel
52-18		September 8-14	58	Northern Edge
52-19		September 25-October 2	81	Northern Edge
52-20		October 1-9	69	Northern Edge
			7	Southeast Part
52-21	D (November to January)	October 30-November 7	40	Northern Edge
			31	Southeast Part
			5	East Side South Channel
52-22		November 5-14	68	Northern Edge
			7	Southeast Part
52-23		December 4-11	52	Northern Edge
			10	Southeast Part
53-1		January 5-15	7	Northern Edge
			33	Southeast Part
			36	East Side South Channel
			9	South Channel
			1,267	

TABLE 2.--The destruction of haddock (in thousands) on Georges Bank by the Boston and New Bedford fishing fleets, 1952.

Port	Month	Pounds			Numbers		
		Total catch	Discard	Percent discarded	Total catch	Discard	Percent discarded
Boston	January	2,657	64	2.4	1,582	54	3.4
	February	1,416	66	4.7	843	56	6.6
	March	1,811	15	0.8	1,078	13	1.2
	April	796	29	3.6	474	24	5.1
	May	5,141	230	4.5	3,060	195	6.4
	June	8,522	1,447	17.0	5,073	1,226	24.2
	July	9,872	1,126	11.4	5,876	954	16.2
	August	9,604	619	6.4	5,649	601	10.6
	September	8,442	118	1.4	4,966	114	2.3
	October	7,558	180	2.4	4,446	175	3.9
	November	4,303	32	0.7	2,850	42	1.5
	December	5,544	288	5.2	3,672	379	10.3
Total		65,666	4,214	6.4	39,569	3,833	9.7
New Bedford	January	574	2	0.3	342	2	0.6
	February	359	0	0.0	214	0	0.0
	March	673	0	0.0	400	0	0.0
	April	2,113	70	3.3	1,258	59	4.7
	May	2,052	138	6.7	1,221	117	9.6
	June	1,188	48	4.0	707	41	5.8
	July	889	129	14.5	529	109	20.6
	August	1,383	153	11.1	814	148	18.2
	September	1,224	66	5.4	720	64	8.9
	October	718	33	4.6	422	32	7.6
	November	753	20	2.6	499	26	5.2
	December	667	2	0.3	442	3	0.7
Total		12,593	661	5.2	7,568	601	7.9
Both Ports	January	3,231	66	2.0	1,924	56	2.9
	February	1,775	66	3.7	1,056	56	5.3
	March	2,484	15	0.6	1,478	13	0.9
	April	2,909	99	3.4	1,732	83	4.8
	May	7,193	368	5.1	4,282	312	7.3
	June	9,710	1,495	15.4	5,780	1,267	21.9
	July	10,761	1,255	11.7	6,405	1,063	16.6
	August	10,987	772	7.0	6,463	749	11.6
	September	9,666	184	1.9	5,686	178	3.1
	October	8,276	213	2.6	4,868	207	4.2
	November	5,056	52	1.0	3,349	68	2.0
	December	6,211	290	4.7	4,114	382	9.3
Total		78,259	4,875	6.2	47,137	4,434	9.4

Fig. 2—Port agent of the Fish and Wildlife Service interviewing the mate of one of the Boston trawlers.

the average annual discard of the previous 5-year period, 1947-1951.

The Boston fleet discarded over 6 percent by weight of the haddock caught by that fleet during 1952. This was equivalent to discarding about 1 out of every 10 haddock caught. The New Bedford fleet discarded over 5 percent by weight of the total quantity of haddock caught; or, 1 out of very 12 fish caught.

Season of Discard

The quantity of baby haddock destroyed on Georges Bank, varied with the season of the year, as can be seen by a comparison of monthly records in table 2 and figure 3. The greatest destruction was reported during the summer months, as in previous years, with June the month of most discard. In this particular month, discards of more than 15 percent by weight of the fish caught were reported. This was equivalent to more than 1 out of every 5 fish caught.

Area of Discard

Discard by area was summarized by plotting the amounts of discard reported by the Boston and New Bedford fishing fleets by units of 10' latitude by 10' longitude. The localities where haddock were discarded during the 1952 haddock year are shown in figure 4.

The areas of greatest destruction were the Northern Edge and Southeast part of Georges. Quantities of discard were also reported on the Southwest part of Georges. Lesser amounts were discarded in the South Channel area and in the vicinity of Cultivator Buoy.

As in previous years, areas of greatest discard reflect areas of greatest concentration of fishing effort, and not necessarily the areas of greatest abundance of unmarketable sizes. It is known that in shoal water portions of the Southeast part of Georges small fish predominate during most of the year. These areas are avoided, whenever possible, by the fleet because of the difficulty encountered in culling out unmarketable fish.

PART II. SEA SAMPLING

ANALYSIS OF DISCARDS, 1952

The quantities discarded on each of the commercial sea sampling trips during 1952 are presented in table 3.

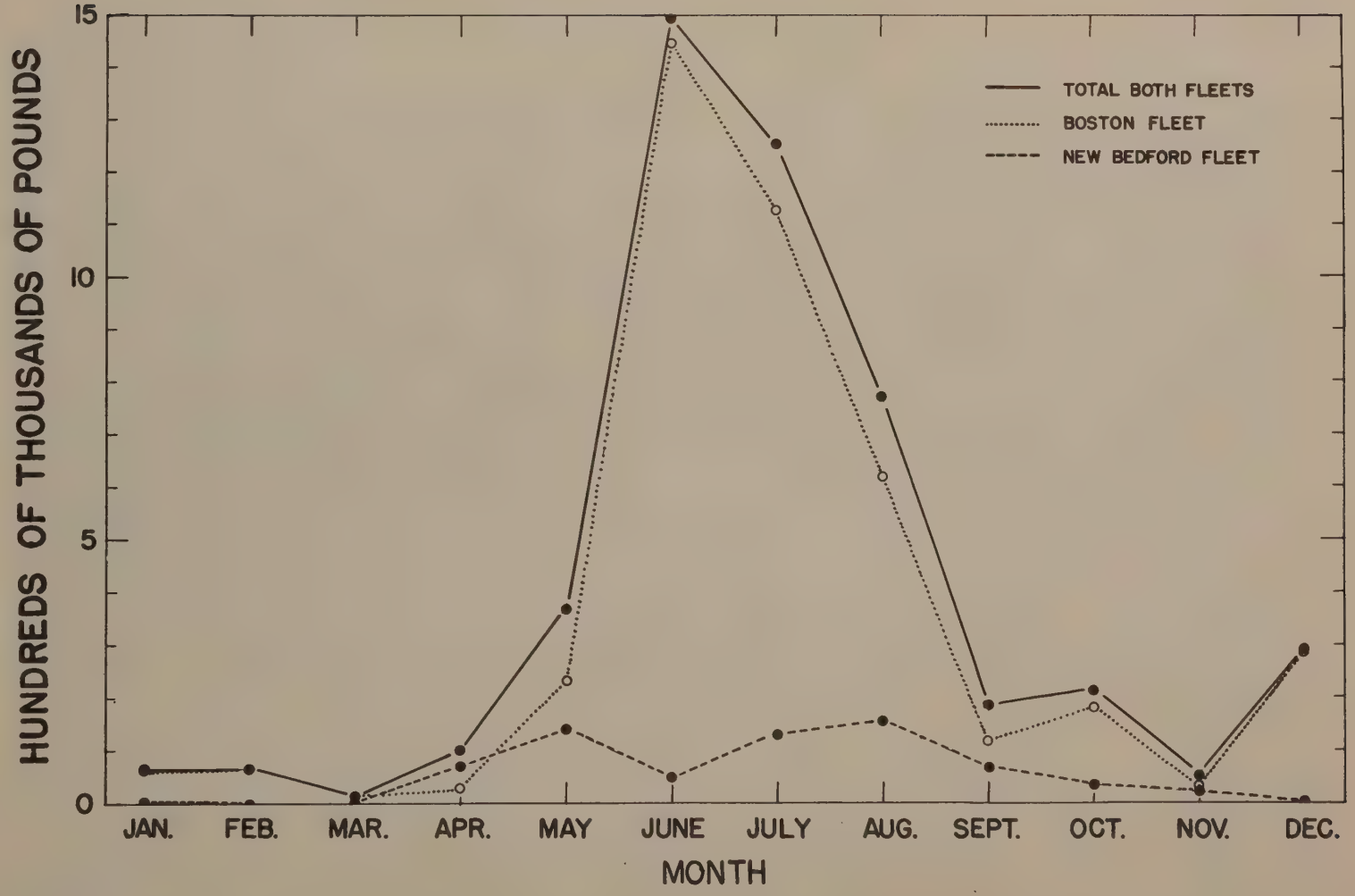

Fig. 3--Destruction of haddock on Georges Bank by the Boston and New Bedford fishing fleets, 1952

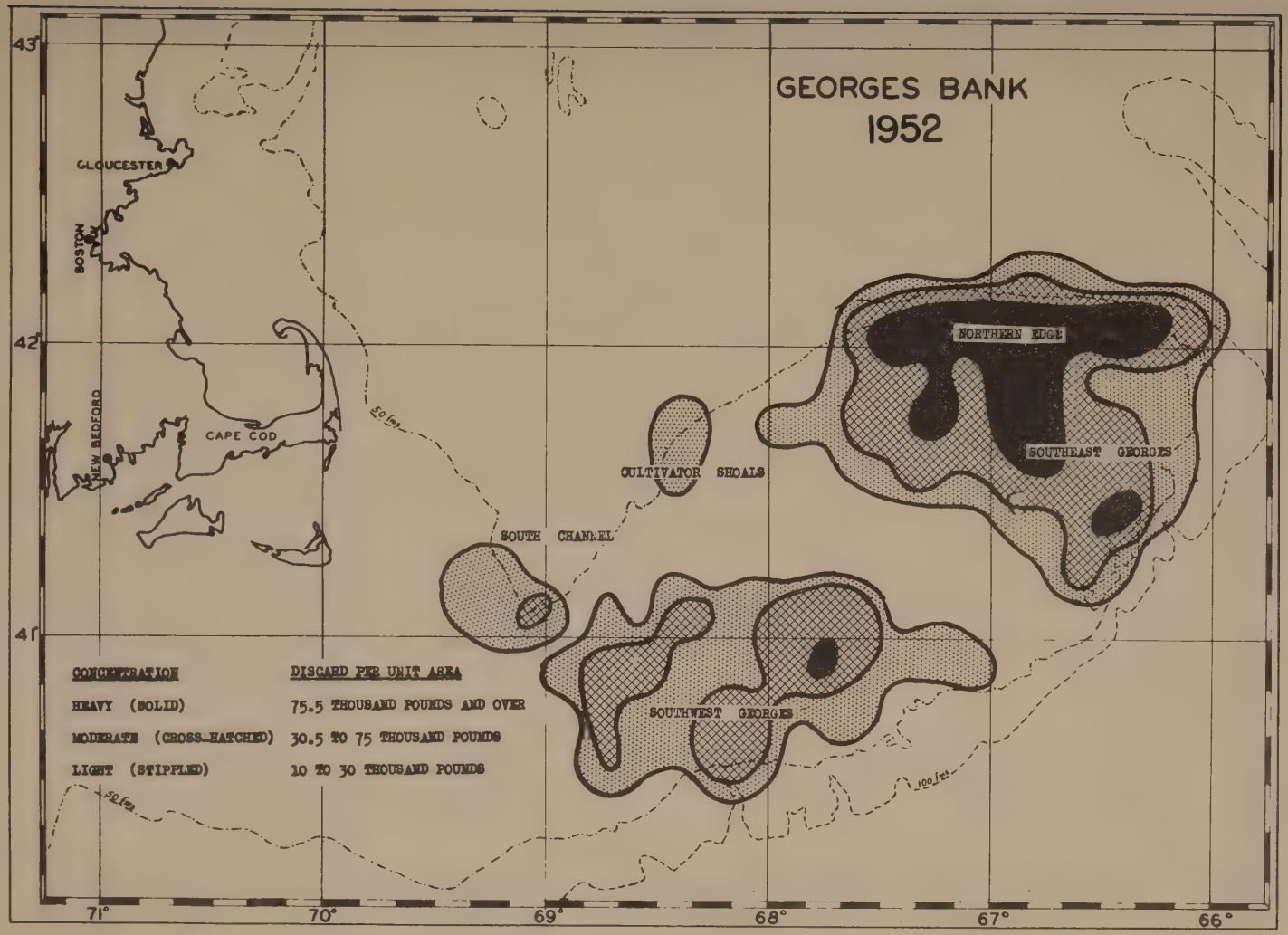

Fig. 4--Localities where haddock were discarded by the Boston and New Bedford fishing fleets during 1952

TABLE 3.--Discards on each of the commercial sea sampling trips to Georges Bank observed during the 1952 haddock year.

Season	Trip number	Pounds			Numbers		
		Caught	Discarded	Percent discarded	Caught	Discarded	Percent discarded
B	52-8	100,470	9,260	9.2	57,078	9,815	17.2
(May to	52-9	48,770	2,770	5.7	1/	3,244	----
July)	52-10	143,253	28,253	19.7	71,271	19,520	27.4
	52-11	50,159	3,659	7.3	33,468	3,339	10.0
	52-12	79,128	4,033	5.1	64,740	4,675	7.2
	Ave. trip	84,356	9,595	11.4	55,421	8,119	14.6
C	52-13	157,613	8,988	5.7	89,110	8,312	10.2
(August	52-14	98,665	5,315	5.0	58,421	5,330	9.0
to	52-15	120,651	5,615	4.7	71,797	5,274	7.3
October)	52-16	88,887	4,887	9.0	57,803	5,213	6.2
	52-17	63,403	1,403	2.1	34,424	1,305	3.8
	52-18	49,850	850	1.7	30,509	853	2.8
	52-19	130,135	2,135	2.7	78,177	2,044	2.6
	52-20	95,337	1,037	1.1	53,308	1,113	2.1
	Ave. trip	100,568	3,779	3.8	59,106	3,681	6.2
D	52-21	38,871	8,371	21.5	22,134	9,850	44.5
(November	52-22	54,463	463	0.8	27,405	688	2.5
to	52-23	146,975	20,975	14.3	126,659	28,941	22.8
January)	53-1	65,996	1,996	3.0	26,642	2,362	8.9
	Ave. trip	76,576	7,951	10.4	50,710	10,460	20.6
All Seasons	Ave.trip	90,154	6,471	7.2	56,016	6,581	11.7

1/ No sample of the landed portion of the catch was taken on trip number 52-9.

Weight of Discards

The average haddock discard per trip (based on eighteen observed trips) during 1952 was about 6,500 pounds. This was slightly less than the average discard of about 6,700 pounds per trip in 1951. During both the 1951 and 1952 haddock years, about 7 percent of the total catch by weight was discarded on the observed trips. Referring to table 2, we note that about 6-1/2 percent of the total Boston catch by weight, based on skippers' reports, was discarded during 1952. Thus there is a good agreement between the estimate of destruction based on skippers' reports and that based on biologists' sampling at sea.

During 1952, it was also possible to derive average trip data for Seasons B, C and D. Since there was very little fishing on Georges Bank during Season A, it was not possible to arrange for an observer to make a trip there at that time. A seasonal variation in the amount of discard is evident (as previously pointed out in the discussion of skippers' estimates), ranging from an average of 3,779 pounds per trip during Season C to an average of 9,595 pounds per trip during Season B. Causes of this variation will be discussed in subsequent sections of this paper.

Numbers discarded

The average number of haddock discarded per observed trip during 1952 was 6,581 fish, as compared to 8,828 in 1951. During 1952, almost 12 percent of the total numbers caught were discarded, whereas in 1951, 17 percent were discarded. Although almost the same weight was discarded per trip in 1952 as in 1951, the average weight per fish discarded was greater (the number of fish discarded was less). (See p. 19)

The average numbers discarded per trip ranged from 3,681 during Season C to 10,460 during Season D. Although pounds discarded per trip were greatest during Season B, numbers were greatest during Season D, because of the much lower average weight per discarded fish during the latter season.

Estimated total destruction

Using the average discard per trip obtained from the sea sampling data, we arrived at an estimate of destruction of about 4.6 million pounds for the period May 1952 to January 1953 (Seasons B, C and D, 1952). The estimate of destruction by the Boston fleet, as reported by skippers to the port interviewer, during this same period was about 4.3 million pounds. The port interview estimate differed from the sea sampling estimate by about 6-1/2 percent. In 1951, this difference was 12-1/2 percent. This close agreement indicates that our observed trips are representative of the entire fleet.

It is believed that this close agreement of estimates of destruction derived by two different methods is not due to chance. Estimates

supplied by skippers to the port interviewer at Boston for trips on which we had observers were similar to those reported by our sea samplers.

Average weight

The average weights of individual fish taken on the observed trips are shown in table 4. The average weight of haddock caught on these trips was 1.61 pounds. This compares with 1.80 pounds, the average weight of fish caught in 1951. This difference is due to a difference in year class dominance in the two years; two-year-olds (1950 year class) dominated in 1952 while three-year-olds (1948 year class) dominated in 1951.

The average weight of fish discarded was greater than in 1951 while the average weight of fish landed was less. This is related to the difference in age composition in the two years and a difference in culling (see p. 23).

Considerable variation in average weight is evident on the individual trips, but seasonal averages are fairly consistant. Very little seasonal variation was noted in the average weight of landed fish, whereas discarded fish ranged from a high of about 1.2 pounds in average weight during Season B to a low of about 3/4 pounds during Season D. The reason for this lower average weight during the winter is due largely to the recruitment of 1-year-old fish which begins at this season.

Size composition

The size composition of haddock on the average Georges Bank trip observed during 1952 is presented in table 5 and figure 5.

The size of the haddock caught on the observed trips ranged from 0.2 to 9 pounds (8 to 31 inches), with about 90 percent from 0.7 to 2.9 pounds, (12-1/2 to 20-1/2 inches).

The sizes of discarded haddock ranged from 0.2 to 1.6 pounds (8 to 16-1/2 inches), with over 90 percent from 0.6 to 1.1 pounds (12 to 14-1/2 inches).

The sizes in the landed portion of the catch ranged from 0.6 to 9.0 pounds (11-1/2 to 31 inches), with over 90 percent from 0.9 to 2.9 pounds (13-1/2 to 20-1/2 inches).

In comparing these data with size compositions obtained in 1951, we note that during 1951 more of the smaller sizes were present in the sample than in 1952. This was due to the presence of a large year class of 1-year-olds (1950 year class) coming into the fishery in 1951. During 1952,

TABLE 4.--Average weight (in pounds) of haddock on the commercial sea sampling trips to Georges Bank observed during the 1952 haddock year

Season	Trip number	Average weight per fish caught	Average weight per fish discarded	Average weight per fish landed
B (May to July)	52-8	1.76	0.94	1.93
	52-9	1/	0.85	1/
	52-10	2.01	1.45	2.22
	52-11	1.50	1.10	1.54
	52-12	1.22	0.86	1.26
	Ave. trip	1.68	1.18	1.73
C (August to October)	52-13	1.77	1.08	1.84
	52-14	1.69	1.00	1.76
	52-15	1.68	1.06	1.73
	52-16	1.54	0.94	1.60
	52-17	1.84	1.08	1.87
	52-18	1.63	1.00	1.65
	52-19	1.66	1.04	1.68
	52-20	1.79	0.93	1.81
	Ave. trip	1.70	1.03	1.75
D (November to January)	52-21	1.76	0.85	2.48
	52-22	1.99	0.67	2.02
	52-23	1.16	0.72	1.29
	53-1	2.48	0.84	2.64
	Ave. trip	1.51	0.76	1.70
All seasons Ave. trip		1.61	0.98	1.69

1/ No sample of the landed portion of the catch was taken on trip number 52-9.

TABLE 5.--Size composition and cull on the average Georges Bank trip observed during the 1952 haddock year.

Length in cms.	Inches	Average weight (gutted) in pounds	Numbers			Percent	
			caught	discarded	landed	discarded	landed
20	7.9	0.19	1	1		100.0	0.0
21	8.3	0.22	1	1		100.0	0.0
22	8.7	0.25	3	3		100.0	0.0
23	9.1	0.29	3	3		100.0	0.0
24	9.4	0.32	6	6		100.0	0.0
25	9.8	0.36	18	18		100.0	0.0
26	10.2	0.40	26	26		100.0	0.0
27	10.6	0.45	37	37		100.0	0.0
28	11.0	0.50	75	75		100.0	0.0
29	11.4	0.55	185	182	3	98.4	1.6
30	11.8	0.61	338	319	19	94.4	5.6
31	12.2	0.67	610	531	79	87.0	13.0
32	12.6	0.73	1,086	834	252	76.8	23.2
33	13.0	0.79	1,887	1,309	578	69.4	30.6
34	13.4	0.87	2,084	1,014	1,070	48.6	51.4
35	13.8	0.94	2,762	894	1,868	32.4	67.6
36	14.2	1.0	3,539	694	2,845	19.6	80.4
37	14.6	1.1	3,896	375	3,521	9.6	90.4
38	15.0	1.2	4,411	169	4,242	3.8	96.2
39	15.4	1.3	4,500	62	4,438	1.4	98.6
40	15.8	1.4	4,481	24	4,457	0.5	99.5
41	16.1	1.5	3,905	3	3,902	0.1	99.9
42	16.5	1.6	3,103	1	3,102	0.0	100.0
43	16.9	1.7	2,646		2,646	0.0	100.0
44	17.3	1.8	2,168		2,168	0.0	100.0
45	17.7	1.9	1,888		1,888	0.0	100.0
46	18.1	2.0	1,580		1,580	0.0	100.0
47	18.5	2.2	1,529		1,529	0.0	100.0
48	18.9	2.3	1,421		1,421	0.0	100.0
49	19.3	2.4	1,154		1,154	0.0	100.0
50	19.7	2.6	1,157		1,157	0.0	100.0

TABLE 5.--Size composition and cull on the average Georges Bank trip observed during the 1952 haddock year. (continued)

Length in cms.	Inches	Average weight (gutted) in pounds	Numbers caught	Numbers discarded	Numbers landed	Percent discarded	Percent landed
51	20.1	2.7	814		814	0.0	100.0
52	20.5	2.9	901		901	0.0	100.0
53	20.9	3.1	740		740	0.0	100.0
54	21.3	3.2	598		598	0.0	100.0
55	21.7	3.4	552		552	0.0	100.0
56	22.1	3.5	353		353	0.0	100.0
57	22.4	3.7	292		292	0.0	100.0
58	22.8	3.9	236		236	0.0	100.0
59	23.2	4.1	170		170	0.0	100.0
60	23.6	4.3	131		131	0.0	100.0
61	24.0	4.5	126		126	0.0	100.0
62	24.4	4.7	96		96	0.0	100.0
63	24.8	4.9	79		79	0.0	100.0
64	25.2	5.2	55		55	0.0	100.0
65	25.6	5.4	60		60	0.0	100.0
66	26.0	5.6	54		54	0.0	100.0
67	26.4	5.9	55		55	0.0	100.0
68	26.8	6.1	59		59	0.0	100.0
69	27.2	6.4	43		43	0.0	100.0
70	27.6	6.7	24		24	0.0	100.0
71	28.0	6.9	31		31	0.0	100.0
72	28.3	7.2	13		13	0.0	100.0
73	28.7	7.5	7		7	0.0	100.0
74	29.1	7.8	1		1	0.0	100.0
75	29.5	8.1	11		11	0.0	100.0
76	29.9	8.4	12		12	0.0	100.0
77	30.3	8.7	1		1	0.0	100.0
78	30.7	9.0	2		2	0.0	100.0
TOTAL			56,016	6,581	49,435	11.8	88.2

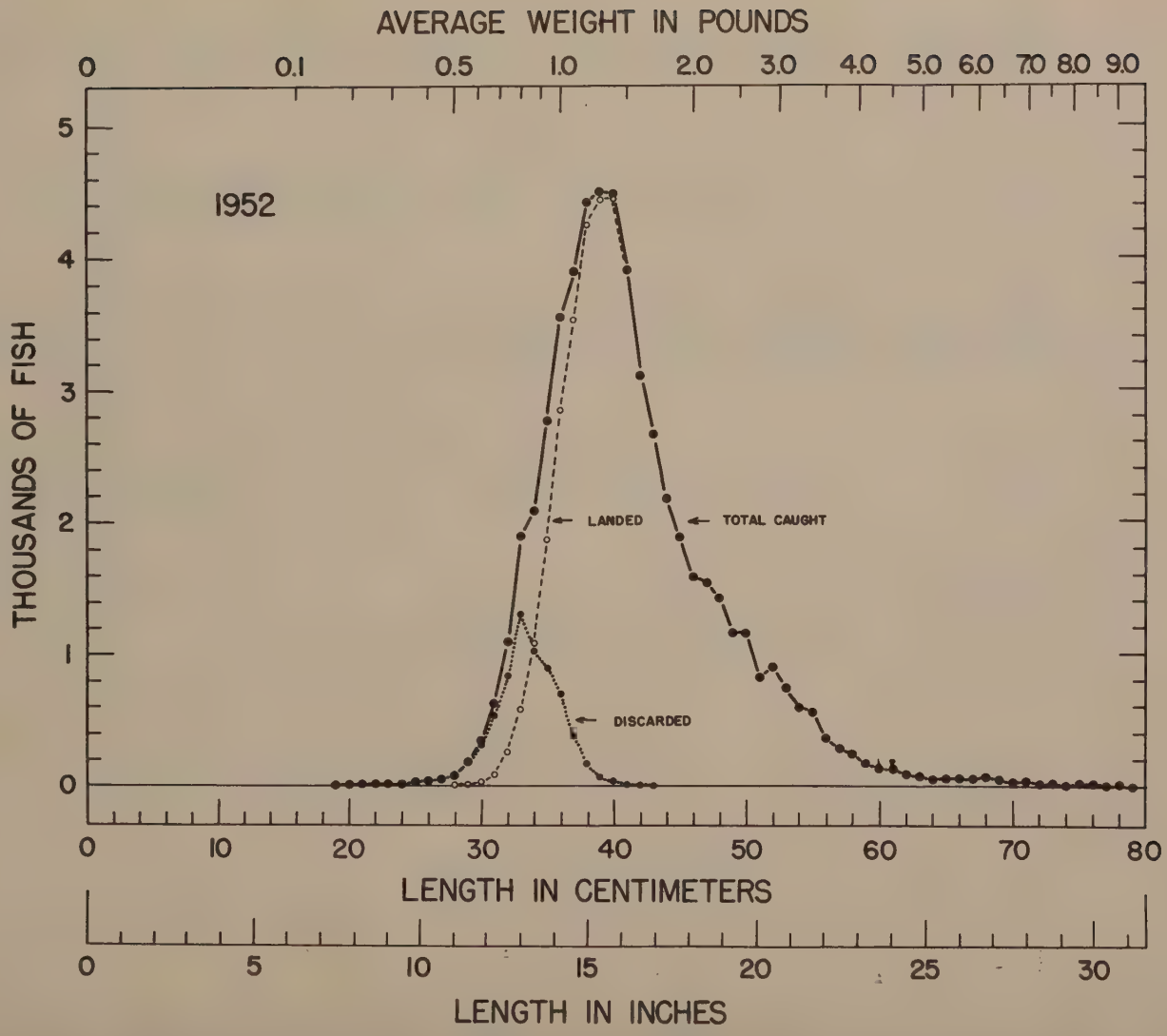

Fig. 5—Size composition on the average Georges Bank trip observed during 1952.

1-year-olds (1951 year class) were extremely scarce and only a few were captured.

Size composition curves were also prepared for each of the three seasons, (figures 6 to 8).

Cull by fishermen

Of the total catch, about 12 percent by number (7 percent by weight) was discarded, while 88 percent by number (93 percent by weight) was landed. Cull curves are presented in figures 9 to 11. Fifty percent points for each trip and for average trips are given in table 6.

Considerable variation in the 50-percent points may be noted on the individual trips, ranging from 0.6 pounds to 1 pound (12 to 15 inches). The size at which fishermen cull depends in part upon the abundance of fish (Premetz, 1953). If catch is poor, fishermen cull at a lower level saving many smaller sizes normally discarded when catch is good. This lowers the 50-percent point. Conversely, if catch is very good, fishermen discard many of the borderline scrod, raising the 50-percent point.

Although individual trip variation is great, the 50 percent points on the seasonal cull curves are similar, ranging from about 0.8 to 0.9 pounds (13.3 to 13.5 inches).

The 50-percent point for all observed trips in 1952 was lower (0.86 pounds) than in 1951 when it was 0.94 pounds. This was due to a dominance of large fish in 1951; three-year-olds as compared with two-year-olds in 1952. Fishermen cull at a high level when larger fish are more abundant.

Age composition

The age composition of haddock on the average Georges Bank trip observed during each season of 1952 are presented in table 7. The percent of each age discarded is presented in table 8.

In 1952, the 1950 year class (2-year-olds) dominated the fishery. Over 62 percent of the haddock caught were from this particular year class. The 1948 year class (4-year-olds) and 1949 year class (3-year-olds) were the next most important contributing 14 and 19 percent, respectively. The other year class contributed only 5 percent of the catch.

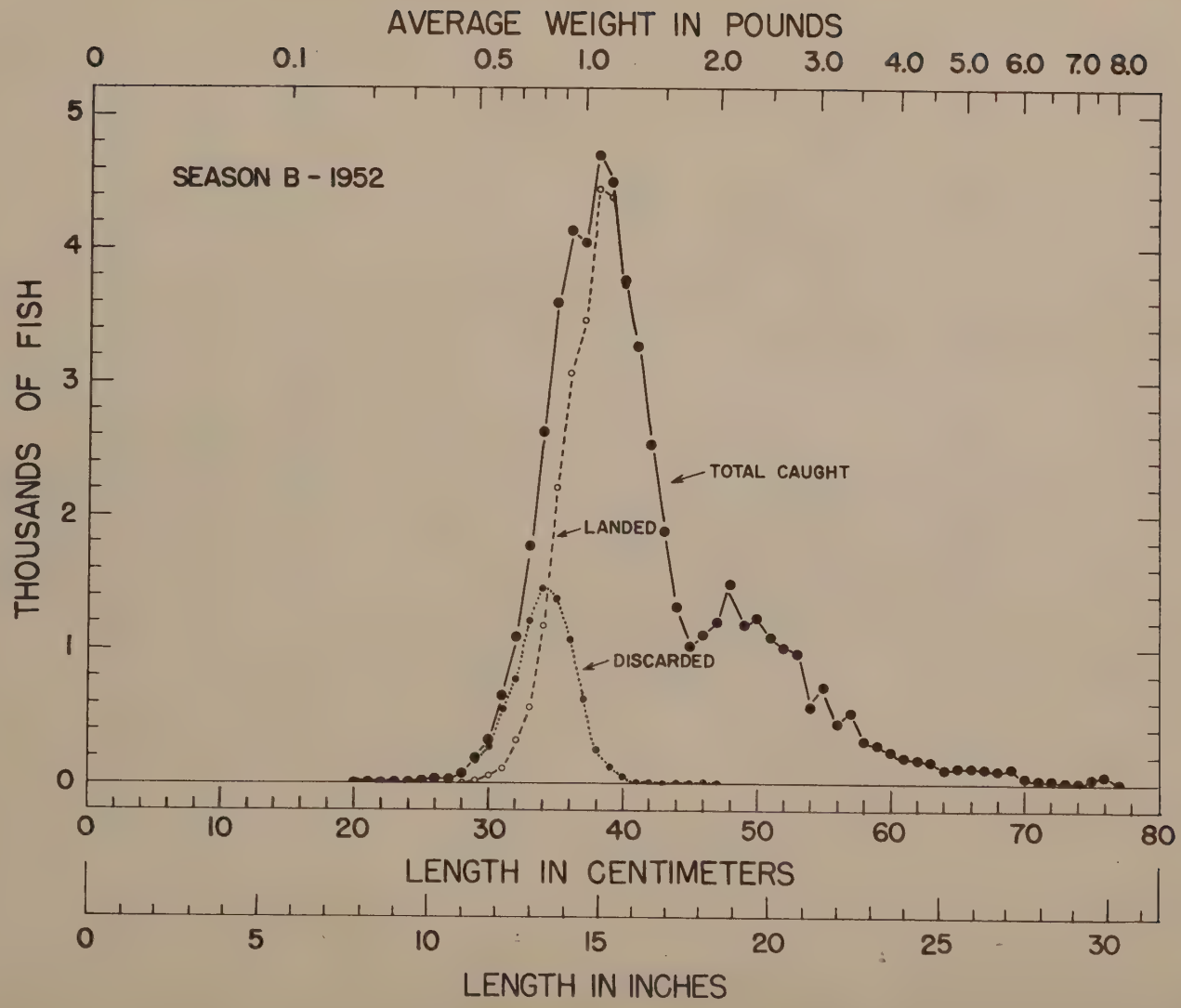

Fig. 6--Size composition on the average Georges Bank trip observed during Season B, 1952.

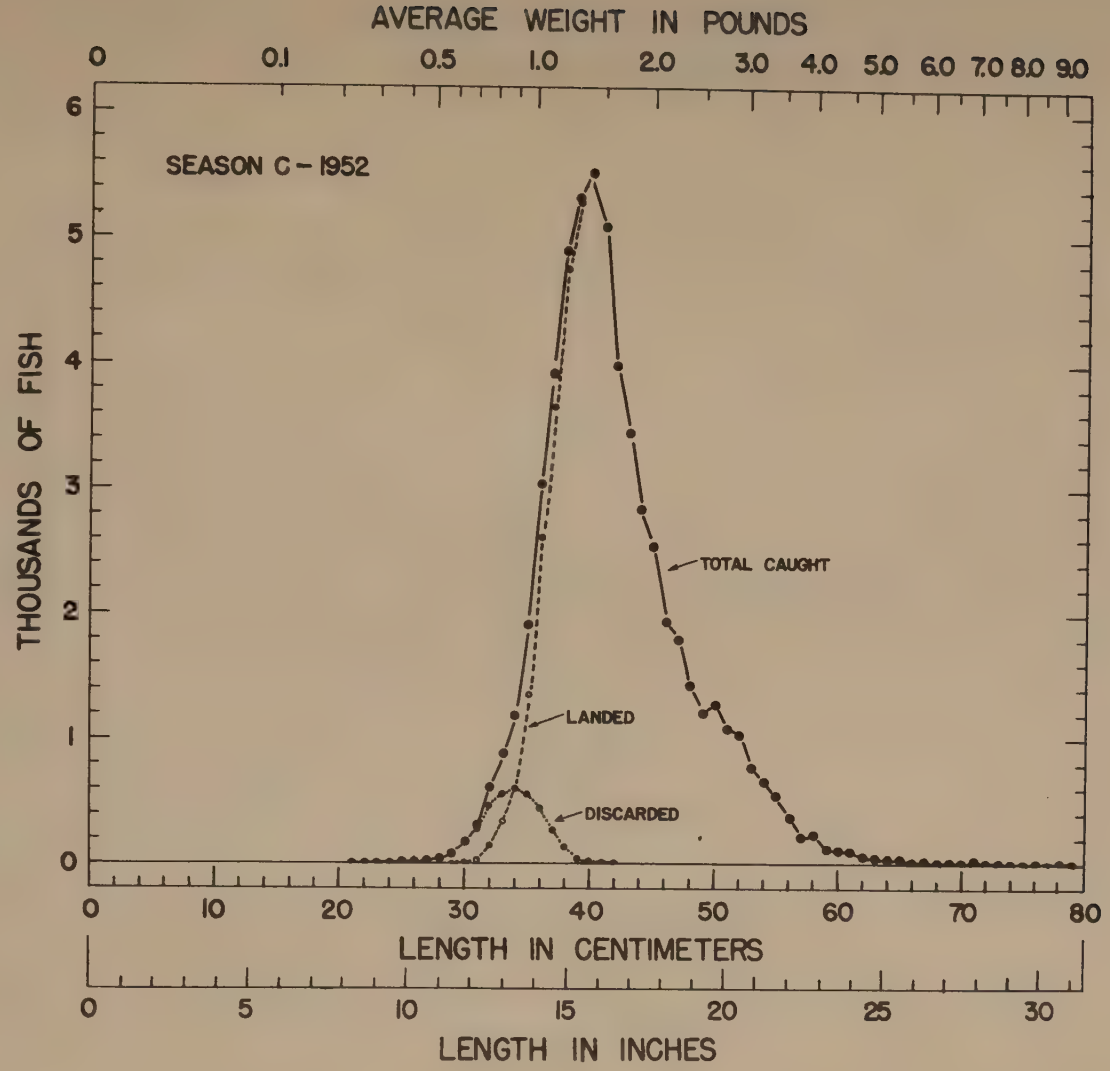

Fig. 7--Size composition on the average Georges Bank trip observed during Season C, 1952

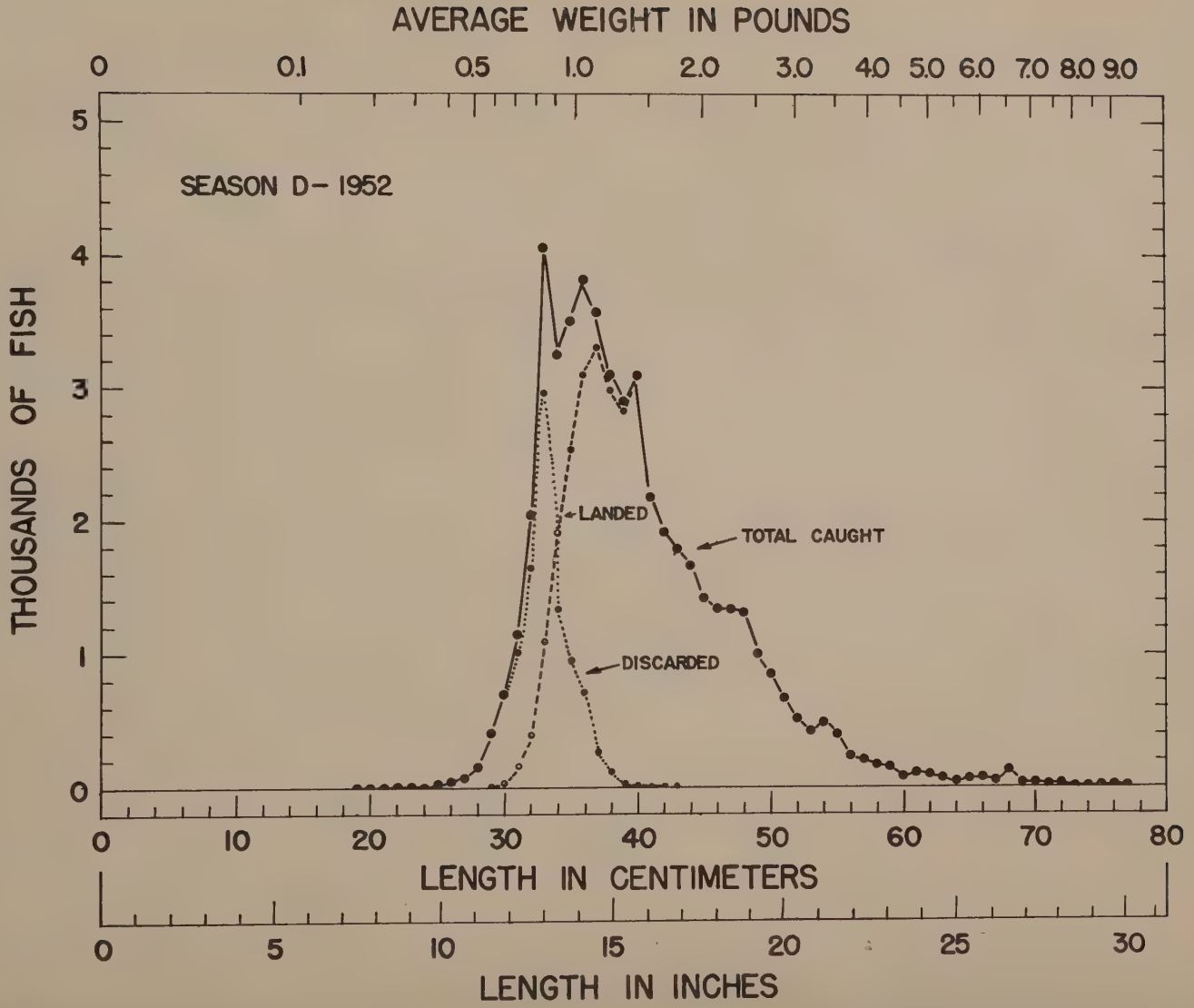

Fig. 8—Size composition on the average Georges Bank trip observed during Season D, 1952.

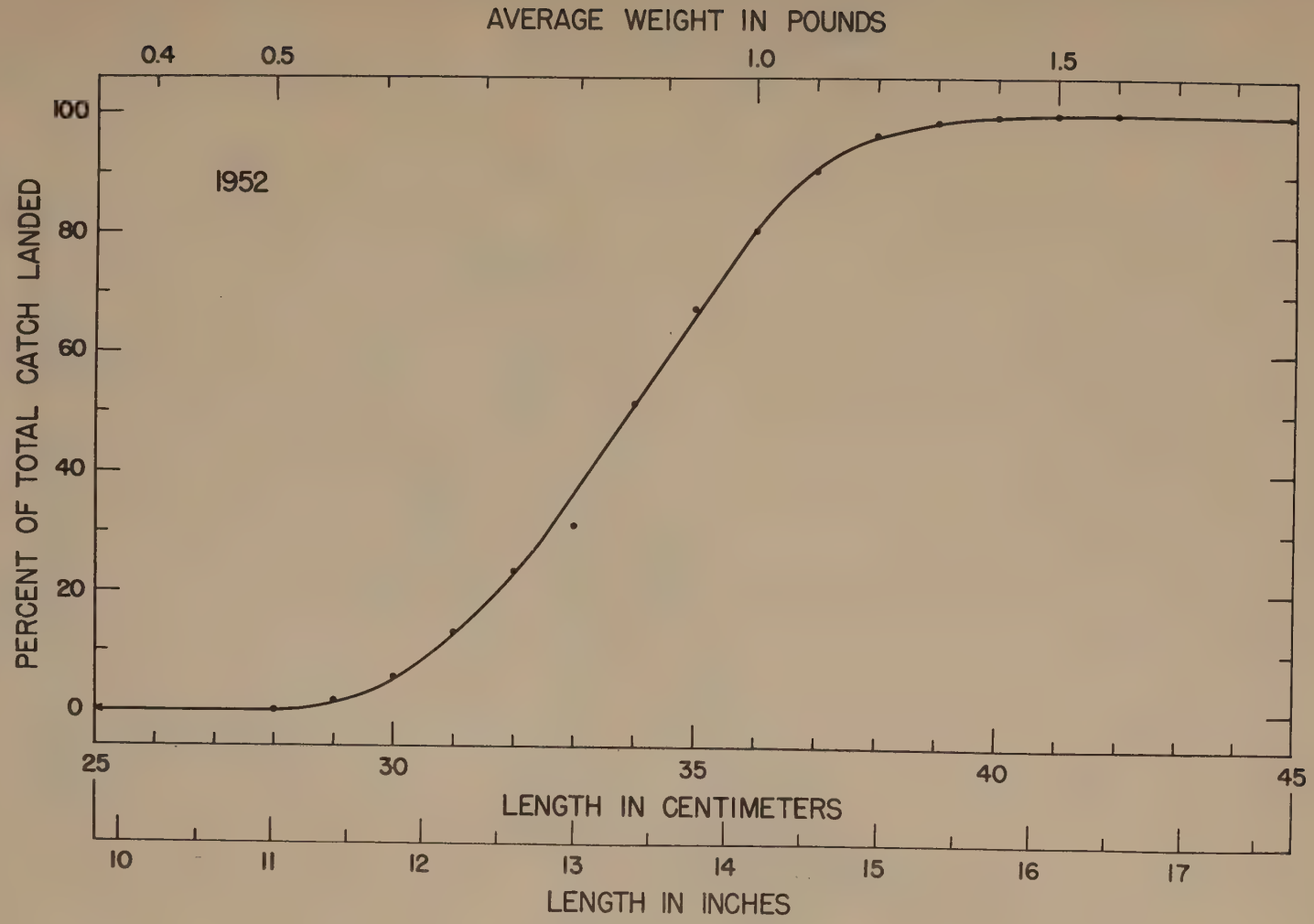

Fig. 9--Haddock cull curve on the average Georges Bank trip observed during 1952.

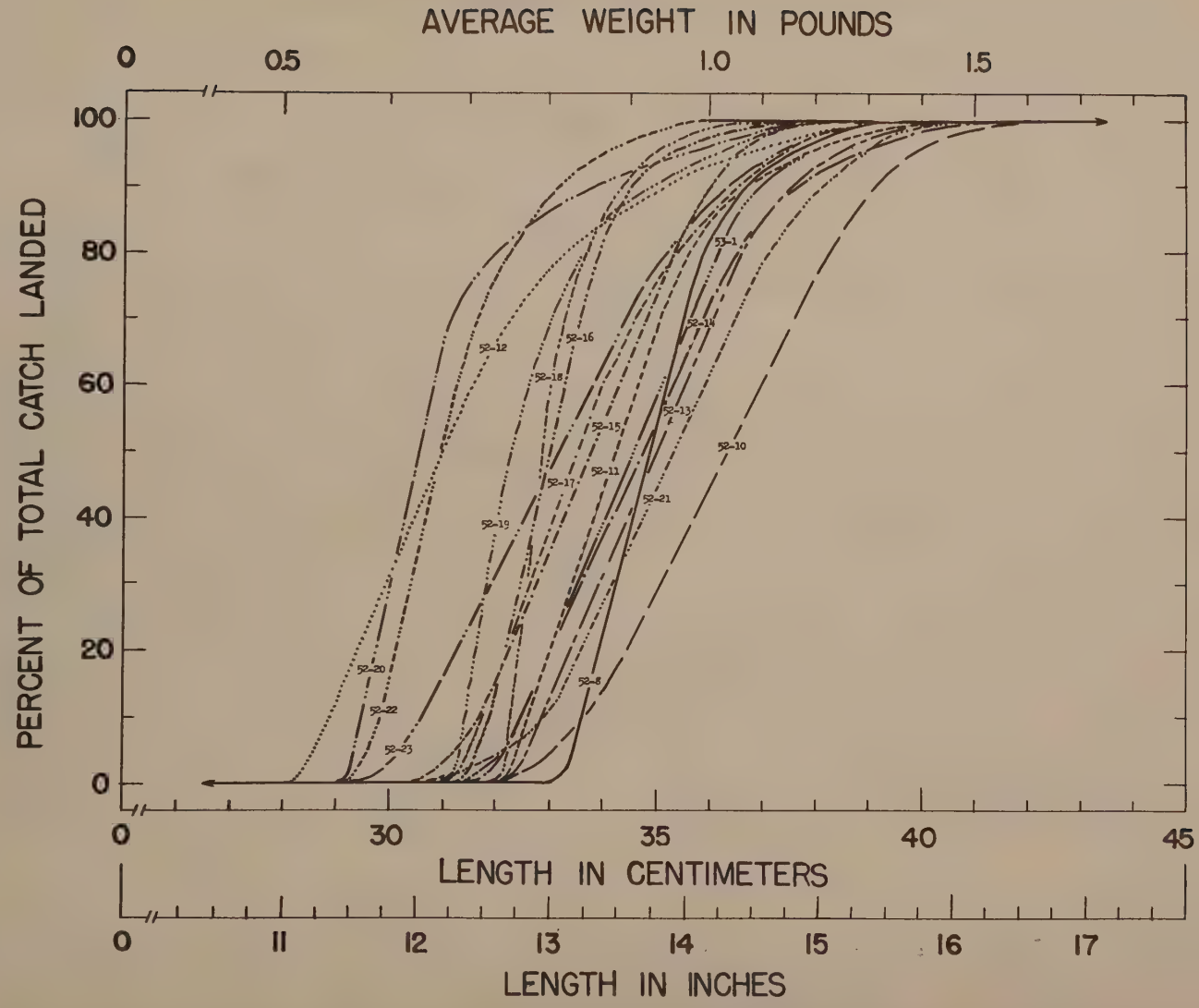

Fig. 10--Cull by fishermen on the individual Georges Bank trips observed during 1952.

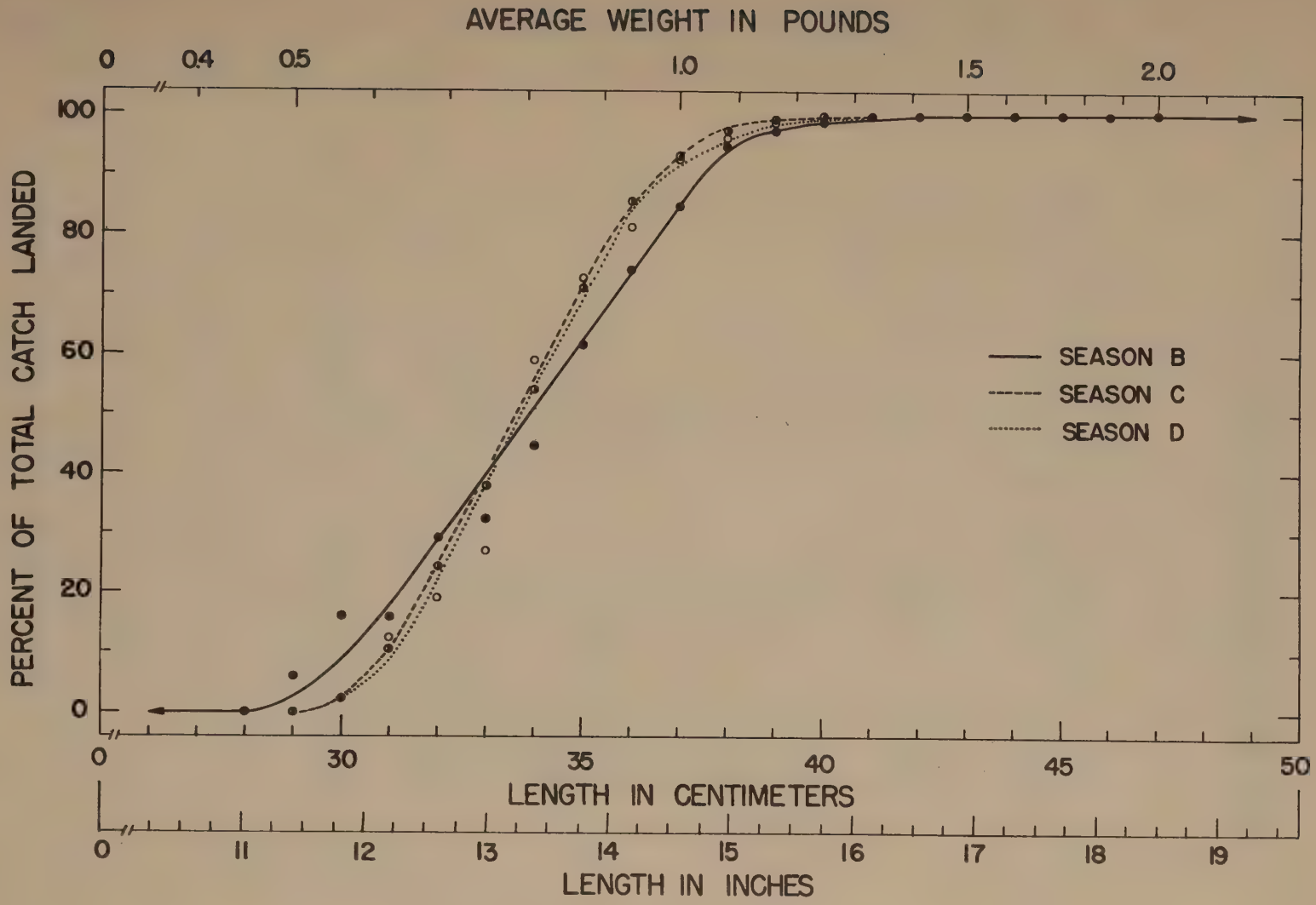

Fig. 11--Cull by fishermen on the average Georges Bank trip observed during Seasons B, C and D, 1952.

TABLE 6.--The 50 percent cull points on curves of individual Georges Bank trips observed during the 1952 haddock year.

Season	Trip number	50 Percent Point		
		Length in cms.	Length in inches	Ave. wt. (gutted) in pounds
B	52-8	34.8	13.7	0.84
	52-10	36.5	14.8	0.89
	52-11	33.8	13.3	0.78
	52-12	31.3	12.3	0.62
	Ave. trip	34.3	13.5	0.81
C	52-13	35.0	13.8	0.96
	52-14	35.1	13.8	0.97
	52-15	34.2	13.5	0.90
	52-16	32.7	12.9	0.80
	52-17	33.5	13.2	0.86
	52-18	32.8	12.9	0.81
	52-19	32.3	12.7	0.77
	52-20	30.2	11.9	0.64
	Ave. trip	33.9	13.3	0.88
D	52-21	35.4	13.9	0.99
	52-22	30.9	12.2	0.67
	52-23	33.6	13.2	0.85
	53-1	35.3	13.9	0.98
	Ave. trip	33.7	13.3	0.86
All Seasons	Ave. trip	33.9	13.3	0.86

TABLE 7.--Age composition of haddock on the average Georges Bank trip observed during Seasons B, C and D of the 1952 haddock year.

Season	Age in years	Year class	Numbers caught	Percent of total catch	Numbers discarded	Percent of total discard	Numbers landed	Percent of total landings
B (May to July)	1	1951	80	0.1	80	1.0	0	0.0
	2	1950	34,260	61.8	7,857	96.8	26,403	55.8
	3	1949	6,712	12.1	182	2.2	6,530	13.8
	4	1948	10,560	19.1	0	0.0	10,560	22.3
	5	1947	2,994	5.4	0	0.0	2,994	6.3
	6+	1946+ earlier	815	1.5	0	0.0	815	1.8
TOTAL			55,421	100.0	8,119	100.0	47,302	100.0
C (August to October)	1	1951	166	0.3	116	4.5	0	0.0
	2	1950	33,239	56.2	3,438	93.4	29,801	53.8
	3	1949	14,137	23.9	77	2.1	14,060	25.4
	4	1948	9,855	16.7	0	0.0	9,855	17.8
	5	1947	1,184	2.0	0	0.0	1,184	2.1
	6+	1946+ earlier	525	0.9	0	0.0	525	0.9
TOTAL			59,106	100.0	3,681	100.0	55,425	100.0

TABLE 7.--Age composition of haddock on the average Georges Bank trip observed during Seasons B, C and D of the 1952 haddock year. (continued)

Season	Age in years	Year class	Numbers caught	Percent of total catch	Numbers discarded	Percent of total discard	Numbers landed	Percent of total landings
D (November to January)	1	1951	871	1.7	871	8.3	0	0.0
	2	1950	36,783	72.5	9,415	90.0	27,368	68.0
	3	1949	7,276	14.4	174	1.7	7,102	17.6
	4	1948	3,913	7.7	0	0	3,913	9.7
	5	1947	1,034	2.1	0	0	1,034	2.6
	6+	1946+ earlier	833	1.6	0	0	833	2.1
TOTAL			50,710	100.0	10,460	100.0	40,250	100.0
B - D (May to January)	1	1951	268	0.5	268	4.1	0	0.0
	2	1950	34,874	62.2	6,188	94.0	28,686	58.0
	3	1949	10,648	19.0	125	1.9	10,523	21.3
	4	1948	8,009	14.3	0	0.0	8,009	16.2
	5	1947	1,388	2.5	0	0.0	1,388	2.8
	6+	1946+ earlier	829	1.5	0	0.0	829	1.7
TOTAL			56,016	100.0	6,581	100.0	49,435	100.0

TABLE 8.--Percent of each age discarded on the average Georges Bank trip observed during Seasons B, C and D of the 1952 haddock year.

Season	Age in years	Year class	Number caught	Number discarded	Percent discarded
B (May to July)	1	1951	80	80	100.0
	2	1950	34,260	7,858	22.9
	3	1949	6,712	181	2.7
	4	1948	10,560	0	0.0
	5	1947	2,994	0	0.0
	6+	1946+ earlier	815	0	0.0
C (August to October)	1	1951	166	166	100.0
	2	1950	33,239	3,438	10.3
	3	1949	14,137	77	0.5
	4	1948	9,855	0	0.0
	5	1947	1,184	0	0.0
	6+	1946+ earlier	525	0	0.0
D (November to January)	1	1951	871	871	100.0
	2	1950	36,783	9,415	25.6
	3	1949	7,276	174	2.4
	4	1948	3,913	0	0.0
	5	1947	1,034	0	0.0
	6+	1946+ earlier	833	0	0.0
B - D (May to January)	1	1951	268	268	100.0
	2	1950	34,874	6,188	17.7
	3	1949	10,648	125	1.2
	4	1948	8,009	0	0.0
	5	1947	1,388	0	0.0
	6+	1946+ earlier	829	0	0.0

Ninety-four percent of the discarded fish were from the 1950 year class (2-year-olds); the 1949 (3-year-olds) and 1951 (1-year-olds) year classes contributed the remaining 6 percent. Almost 18 percent of the haddock caught from the 1950 year class (2-year-olds) were discarded, while only about 1 percent of those from the 1949 year class (3-year-olds) were in the discard. All of the haddock from the 1950 year class (1-year-olds) were discarded. During 1951, however, 58 percent of the 2-year-olds were discarded. Scarcity of fish during 1952 forced the fleet to save many borderline sizes of scrod which would have been discarded in 1951.

Fifty-eight percent of the haddock landed during 1952 came from the 1950 year class (2-year-olds). The 1948 (4-year-olds) and 1949 (3-year-olds) year classes contributed about 16 and 21 percent, respectively. The remainder of the landed portion was from other year classes.

It is readily evident from these data that the 1950 year class of 2-year-old haddock supported the Georges Bank fishery during 1952. All evidence indicates that this year class is a very good one and heralds a good catch of 3-year-old scrod during 1953. In 1951, the 1948 year class of 3-year-olds supported the fishery, and this year class still exerted considerable influence on the fishery during 1952. The 1949 year class of 2-year-olds was below average in its contribution to the 1951 catch. As 3-year-olds in 1952, these haddock were still below average in their contribution to the fishery. The 1948 year class of 4-year-olds contributed as much to the fishery in 1952 as the 1949 year class of 3-year-olds.

Size composition of the ages

The size composition of the ages in the discarded and landed portions of the 1952 catch shows more strikingly the effect of culling on the different ages of haddock. These size compositions are presented in table 9 and figure 12.

Referring to figure 12, the dominance of the 1950 year class (2-year-olds) in the landings is immediately evident. Also clearly shown is the division of this year class between the discards and the landed fish, with the smaller of these being rejected and the larger included in the marketed group. The small portion of the fish from the 1949 year class (3-year-olds) that is discarded is also clearly shown. One can also see that the influence of the 1948 year class (a very strong year class, as previously noted) is almost as great in its fourth year as is that of the 1949 year class in its third year.

A seasonal breakdown of the size composition of the ages is presented in figures 13 to 15. The progression of the various year classes through the fishery is graphically shown in these seasonal age-size compositions.

TABLE 9.—Size composition of the ages in the catch on the average Georges Bank trip observed during the 1952 haddock year.

Length in cms	Inches	Ave. wt. (gutted) in pounds	Total Catch: Age and Year Class 1 (1951)	2 (1950)	3 (1949)	4 (1948)	5 (1947)	6+ (1946& earlier)	Discards: Age and Year Class 1 (1951)	2 (1950)	3 (1949)	Landings: Age and Year Class 2 (1950)	3 (1949)	4 (1948)	5 (1947)	6+ (1946& earlier)
20	7.9	0.19	1						1							
21	8.3	0.22	1						1							
22	8.7	0.25	3						3							
23	9.1	0.29	3						3							
24	9.4	0.32	6						6							
25	9.8	0.36	18						18							
26	10.2	0.40	15	11					15	11						
27	10.6	0.45	31	6					31	6						
28	11.0	0.50	51	24					51	24						
29	11.4	0.55	44	141					44	138		3				
30	11.8	0.61	41	297					41	278		19				
31	12.2	0.67	17	593					17	514		79				
32	12.6	0.73	28	1,058					28	806		252				
33	13.0	0.79	9	1,878					9	1,300		578				
34	13.4	0.87		2,076	8					1,006	8	1,070				
35	13.8	0.94		2,730	32					862	32	1,868				
36	14.2	1.0		3,430	109					673	21	2,757	88			
37	14.6	1.1		3,574	322					352	23	3,222	299			
38	15.0	1.2		3,957	454					156	13	3,801	441			
39	15.4	1.3		3,858	642					41	21	3,817	621			
40	15.8	1.4		3,659	768	54				18	6	3,641	762	54		
41	16.1	1.5		2,992	862	51				3		2,989	862	51		
42	16.5	1.6		2,143	866	94					1	2,143	865	94		
43	16.9	1.7		1,304	1,117	225						1,304	1,117	225		
44	17.3	1.8		434	1,214	520						434	1,214	520		
45	17.7	1.9		213	1,144	531						213	1,144	531		
46	18.1	2.0		148	812	620						148	812	620		
47	18.5	2.2		200	598	731						200	598	731		
48	18.9	2.3		82	512	776	51					82	512	776	51	
49	19.3	2.4		18	418	685	33					18	418	685	33	
50	19.7	2.6		20	379	701	57					20	379	701	57	
51	20.1	2.7		28	140	603	43					28	140	603	43	
52	20.5	2.9			100	714	87						100	714	87	
53	20.9	3.1			14	525	188	13					14	525	188	13
54	21.3	3.2			62	361	162	13					62	361	162	13
55	21.7	3.4			40	337	162	13					40	337	162	13
56	22.1	3.5			18	163	127	45					18	163	127	45
57	22.4	3.7			8	138	130	16					8	138	130	16
58	22.8	3.9			9	70	70	87					9	70	70	87
59	23.2	4.1				58	53	59						58	53	59
60	23.6	4.3				23	77	31						23	77	31
61	24.0	4.5				7	50	69						7	50	69
62	24.4	4.7				8	40	48						8	40	48
63	24.8	4.9					24	55							24	55
64	25.2	5.2				4	14	37						4	14	37
65	25.6	5.4				4	8	48						4	8	48
66	26.0	5.6				6	6	42						6	6	42
67	26.4	5.9						55								55
68	26.8	6.1					6	53							6	53
69	27.2	6.4						43								43
70	27.6	6.7						24								24
71	28.0	6.9						31								31
72	28.3	7.2						13								13
73	28.7	7.5						7								7
74	29.1	7.8						1								1
75	29.5	8.1						11								11
76	29.9	8.4						12								12
77	30.3	8.7						1								1
78	30.7	90						2								2
TOTAL			268	34,874	10,648	8,009	1,388	829	268	6,188	125	28,686	10,523	8,009	1,388	829

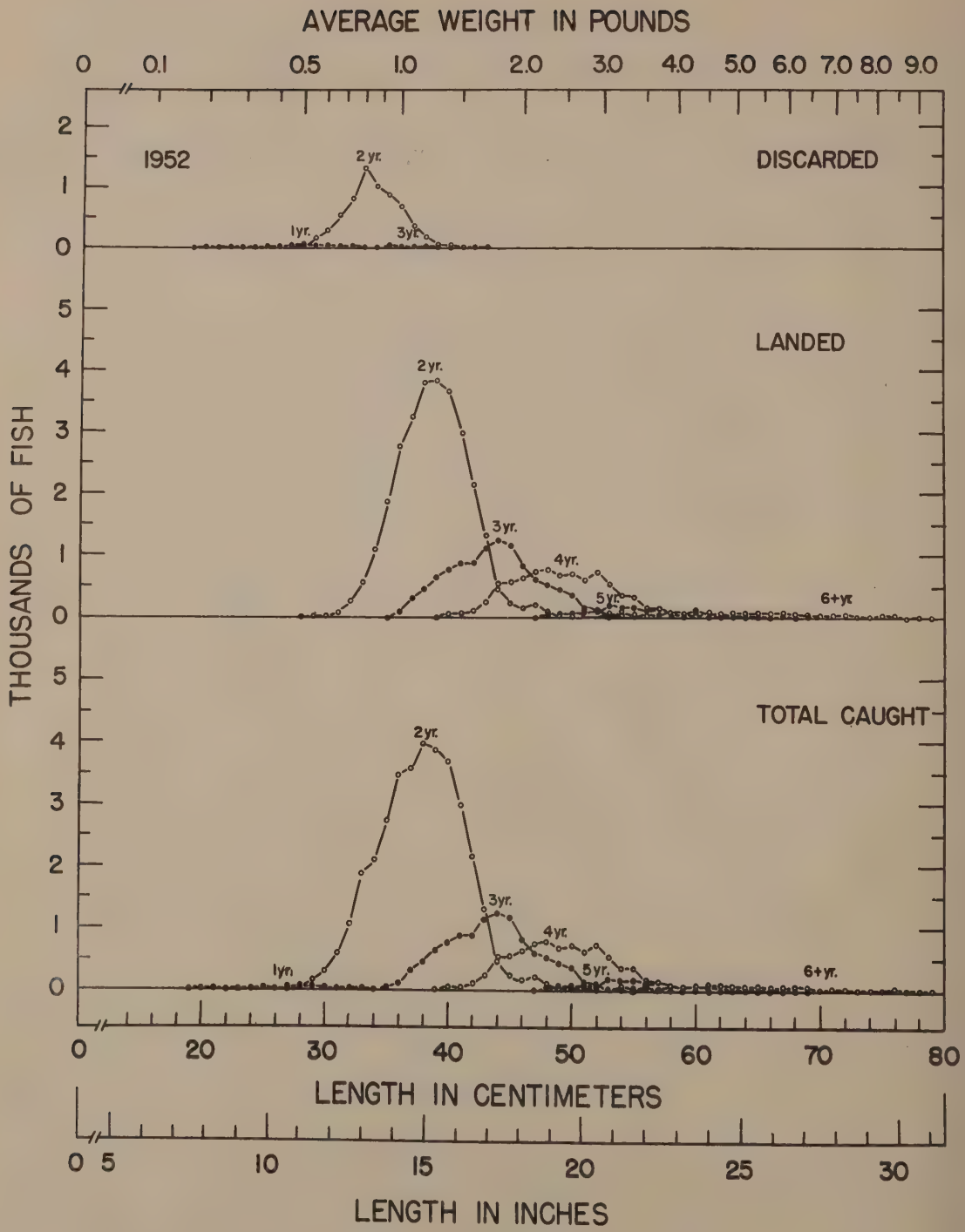

Fig. 12-- Size composition of each age in the catch on the average Georges Bank trip observed during 1952

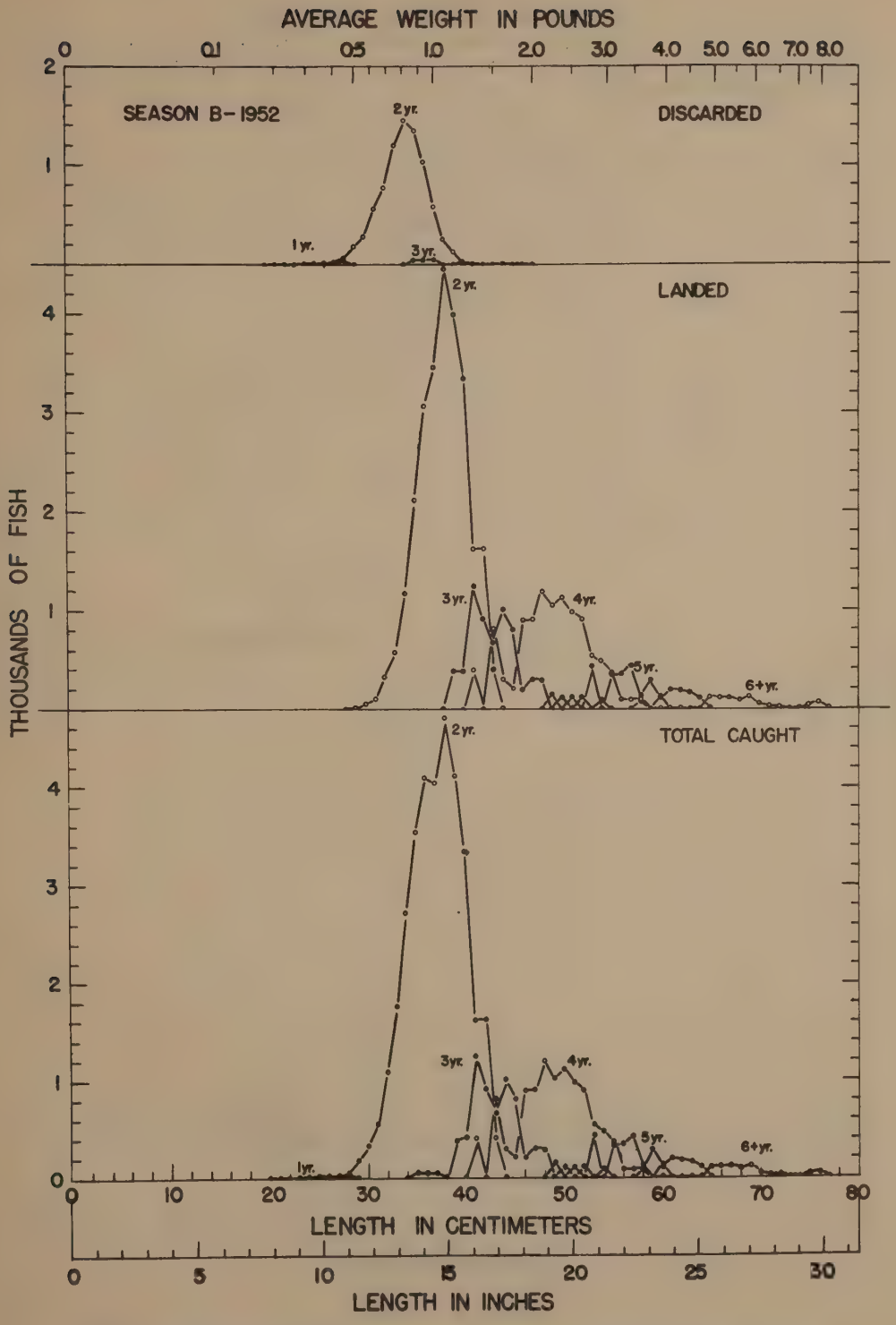

Fig. 13--Size composition of each age in the catch on the average Georges Bank trip observed during Season B, 1952

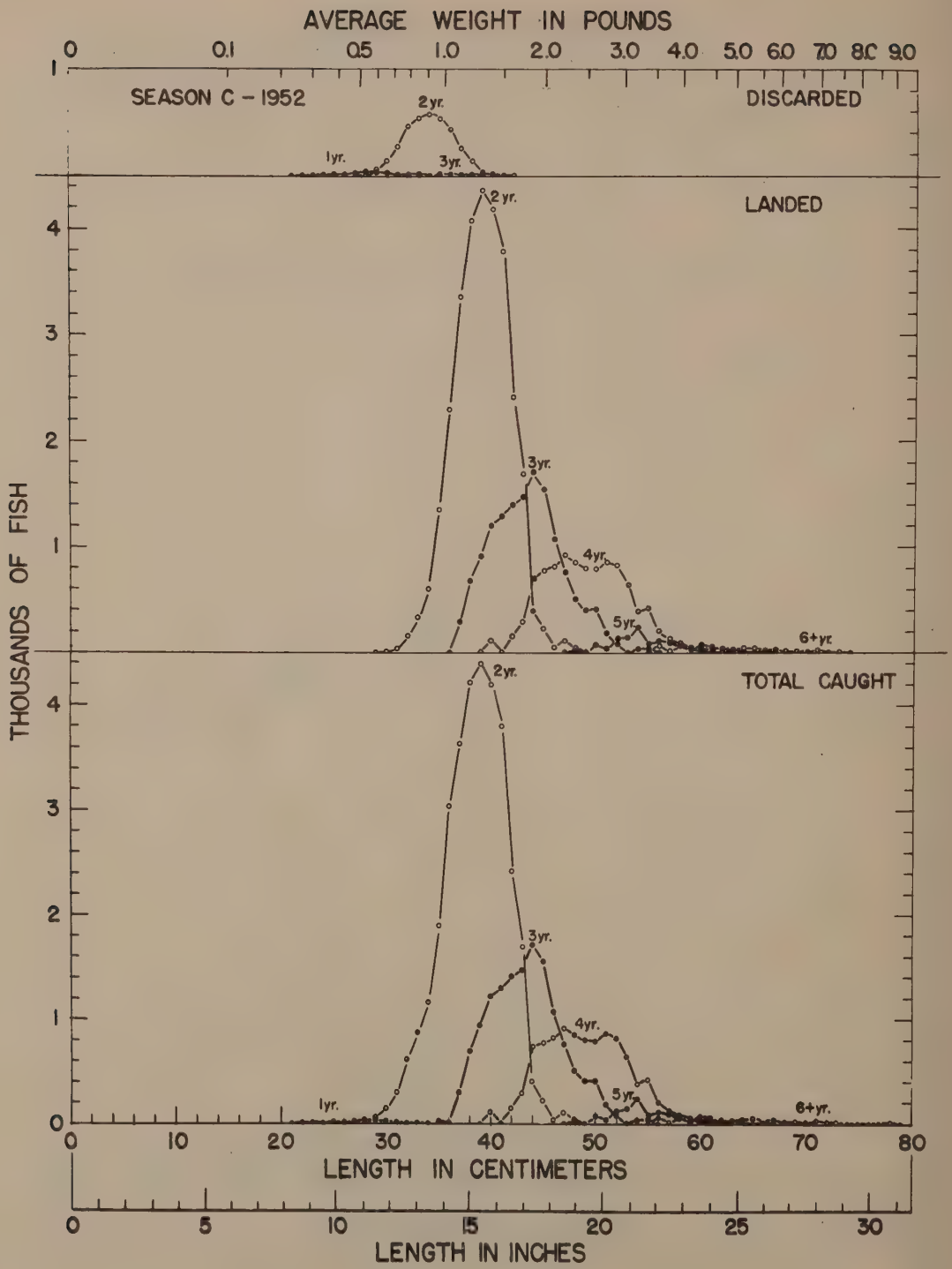

Fig. 14--Size composition of each age in the catch on the average Georges Bank trip observed during Season C, 1952

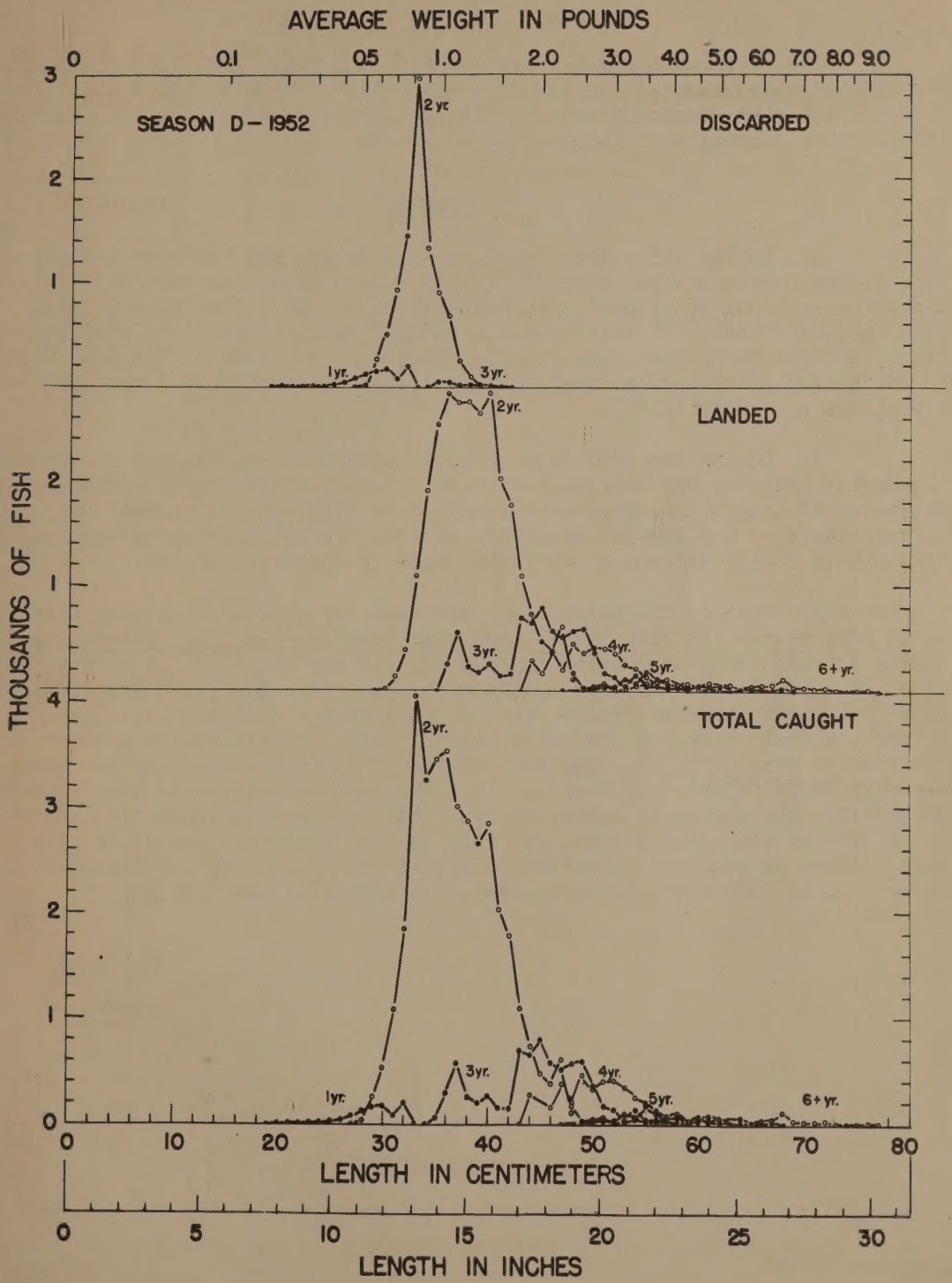

Fig. 15--Size composition of each age in the catch on the average Georges Bank trip observed during Season D, 1952

The size composition curve for the 1949 year class, which exhibited two widely separated peaks in the 1951 collection (Premetz, 1953) shows this phenomenon during Seasons B and D of 1952, but not in Season C. No explanation of this unusual distribution can be given.

SUMMARY

1. During 1952, the destruction of undersized haddock on Georges Bank by the Boston and New Bedford fishing fleets (based on skippers' estimates as reported to port interviewers) was about 4.9 million pounds (4.4. million fish). Of this total, about 4.2 million pounds (3.8 million fish), or over 86 percent, was reported by the Boston fleet. The 1952 discard by the Boston fleet approximates the average annual destruction reported during the period 1947-1951.

2. During the 1952 haddock year, observers went to sea on seventeen commercial trips to the Georges Bank area to analyze the catch. Skippers' estimates of pounds discarded were found to be within 6-1/2 percent of estimates made by the Service observers at sea. In 1951, skippers' estimates were within 12-1/2 percent of estimates made by observers at sea.

3. Most of the destruction was reported during the summer months as in past years. At this time of the year two-year-old fish are attaining a size at which they are caught in quantity but are still not of marketable size. In 1952 the fishery was dominated by two-year-olds (1950 year class). Usually there is a heavy destruction of scrod when a dominant year class enters the fishery during its third year of life, (two-year-olds are in their third year of life). In 1952, however, the destruction was not exceptionally large in spite of the fact that the two-year-olds were very abundant. Older fish were unusually scarce in 1952; the two-year-olds constituted over 62 percent of the total catch. For this reason, fishermen tended to save most of them so that the 50 percent point on the cull curve was somewhat lower than in 1951 when the three-year-olds dominated the fishery.